Rusby in October, 1880, are also to be referred here.

Notholaena limitanea and *N. limitanea mexicana* are in all respects more robust than *N. dealbata.* That species differs particularly in its lesser size, its smaller rhizomes and smaller, often obtusely denticulate scales, its more slender (often capillary), paler stipes, its fewer pinnae, its narrow and much thinner segments (these for the most part with a narrowly cuneate base), its much more oblique veins (often apparent above), and in its very much fewer sporangia, these borne usually in a single row apart from the margin, commonly only one to an individual vein-branch.

The relationship of *N. limitanea* and its subspecies with the variable complex of Mexican and South American plants called *N. nivea* is about equally close. That collective species is distinguished in general, however, by its much greater size, its 2–3-pinnate blades, and its much larger, distinctly stalked, mostly cordate segments, as well as by characters of soriation and rhizome scales.

WASHINGTON, D. C.

Aspidium cristatum×marginale and A. simulatum

RAYNAL DODGE

[The following extracts from a letter written to Mr. C. H. Knowlton by Mr. Dodge in 1907 give a more detailed account of his discovery of the Massachusetts fern and the hybrid between the crested and marginal ferns than has yet appeared and should be of interest to our readers.]

Since boyhood I have been interested in nature study and in making collections of natural objects. My first interest was in birds, bird-egging and gunning, then in

entomology and mineralogy and to some extent in botany, but it was not until about thirty years ago, 1876, that I began to pay especial attention to botany.

I commenced with Gray's "How Plants grow" and various books on floriculture. I then bought Wood's "Class Book," which I gave considerable study. About 1879 I renewed my aquaintance with Mr. Edward Moulton in whose company I had made many expeditions in quest of birds and microscopic material in years gone by. He had been absent from the city for some years, as I had myself.

I found that he had been giving some attention to wild plants and so together we began to make botanical excursions into the surrounding towns and continued to do so for six or eight years or until he again removed from Newburyport. Our expeditions were made usually on Sunday and we sought wild plants with a good deal of persistency. I remember that one season we made botanical excursions on twenty-seven consecutive Sundays, collecting and examining plants, both phaenogams and cryptogams, and as we used the fourth edition of the Manual, both musci and hepaticae were included.

In the mean time we became acquainted with Mr. Alvah A. Eaton of Seabrook, N. H., who was also interested in botanical matters and who introduced us to many fruitful localities in Salisbury, Seabrook and Hampton.

During all this period from 1876 to 1892 and indeed up to the present time I was making a collection of pressed specimens of every plant I considered rare and have the collection yet. Many of these pressed specimens are fern fronds. I did not know the native ferns as well twenty-five years ago as I do now, but I was able to identify all the commoner species and especially I was able to distinguish between [*Aspidium*] *Thelypteris* and [*A.*] *Noveboracense*.

In due course of time Mr. Eaton went to California and Mr. Moulton to West Newbury and for a while I pursued my investigations alone. I soon, however, became acquainted with Dr. William Noyes, a former dental surgeon of Newburyport. I found that Mr. Noyes had for several years been interested in collecting and cultivating ferns. . . . I made many botanical trips with him, sometimes going fifteen or twenty miles from Newburyport and on one eccasion we made an excursion to Mt. Toby. . . .

One Sunday in August, 1891, accompanied by my nephew, I made a trip to the town of Merrimac, visiting a locality where I had been once before, one of my objects being to obtain specimens of *Asplenium thelypteroides*. In lookimg over the ferns of the locality, of which there were quite a number of species, I came across a clump of what at first I took to be an odd looking form of *A. cristatum*. *A. marginale* was abundant on the hillside and *A. cristatum* equally so in the low land between the hill and a neighboring river and I could but notice that this fern new to me grew at the very foot of the hill. I made further search and about fifty yards further on found another clump in the same position—that is, at the foot of the hill. A long-continued quest for the fern both on the hillside and in the low land proved to be fruitless.

I collected specimens and returning home looked up *A. cristatum*, var. *Clintonianum* in the Manual and later in Eaton's "Ferns of North America" (Boston Public Library), but I rejected the idea that it was a variety of *A. cristatum*, having already made up my mind that the new fern was a mix between *A. cristatum* and *A. marginale*. . . . .

I continued my investigations into the new fern. I made a good many botanical excursions the next summer, always having in mind the question of the relative abun-

dance of the fern. I found that, given the proper conditions, a hillside with *marginale* and a swamp with *cristatum*, the new fern, the hybrid, was nearly always to be found at the dividing line. On these excursions I was often alone, but sometimes accompanied by my nephew or by Dr. Noyes. I found the hybrid in Amesbury, Newbury, Topsfield, West Newbury and growing abundantly at Crooked Pond in Boxford.

I got together my notes and in the summer of 1892, made up a package of specimens and sent both notes and specimens to Prof. Eaton of Yale. . . . . [He] coincided . . . . with my views as regards the fern being a hybrid and advised me to publish an account of it. I answered that I preferred to have him do so. Prof. Eaton then sent the package to Mr. Davenport, from whom I a little later received a letter to that effect. I then invited Mr. Davenport to meet me at Topsfield depot, there to take conveyance to Crooked Pond in Boxford. . . .

On arriving at Crooked Pond I showed the fern to Mr. Davenport, growing in as many as a dozen places. In fact, Crooked Pond is, or was, an ideal place for *Aspidium cristatum* × *marginale*. I made it clear to Mr. Davenport that the fern in question grew nearly always at the foot of the rocky hills next the marsh. I showed him that in several instances a large fern occupied the central position with younger ferns clustered about it, and that these smaller ferns had originated from radiating rootstocks, that the fronds resembled those of *marginale* at the tip and those of *cristatum* below, and that the plants had a remarkable tendency to produce misshapen and abortive fronds. I then left the case with Mr. Davenport who lifted some of the ferns to, as he said, cultivate and study them on his grounds at Medford.

In this connection, see Botanical Gazette, Dec. 1894, and Garden and Forest, Vol. IX, No. 454, wherein are

contained articles by Mr. Davenport relating to this fern. It is the same which for years has been known as *A. cristatum*, var. *Clintonianum* which, however, does not grow in eastern Massachusetts. But, nevertheless, our fern, until I showed that it was a probable hybrid, had always been known as var. *Clintonianum*. Several specimens in the herbarium of the Peabody Academy of Sciences are tagged in this way, one or two of them are among the specimens of *A. cristatum*, and it is fair to presume that in the herbarium at Cambridge there are some fronds of this hybrid marked *cristatum Clintonianum*.

But var. *Clintonianum* is as much a product of calcareous soil as are *A. Goldieanum* or *Cystopteris bulbifera*. I have had a half dozen plants of Clintonianum under cultivation, some from western Massachusetts, and some from New York. One of these plants was sent me by an attorney of Buffalo after an examination of Judge Clinton's specimens in the herbarium of the Buffalo Academy of Sciences. I received this fern with the understanding that it was taken from the identical swamp where Judge Clinton collected his plants. These plants of *A. cris[tatum] Clin[tonianum]* are unlike the plants of *A. cris[tatum]* × *marg[inale]* although the books have made no distinction between them. The idea I have regarding the fern which has been named var. *Clintonianum* and especially regarding Judge Clinton's plant is that it is a hybrid between *Aspidium Goldieanum* and *Aspidium cristatum*. They have every appearance of this and I think the subject should be investigated.

ASPIDIUM SIMULATUM

In August, 1891, Mr. William H. Swasey of Newburyport showed me a peculiarly shaped frond which he had taken from a fern growing at the "Pines," so called, at Newburyport. This frond had somewhat the appear-

ance of one from a plant of *Aspidium Noveboracense*. Its lower pinnae, however, were more like those of *A. Thelypteris*, but broader, ovate, acuminate and inflexed. The venation was that of *Nove*[*boracense*].

At his invitation, I accompanied him to the locality. We found but few ferns having fronds of this peculiar character and these not well grown, compared with many which I afterward found. A few days later, Mr. Swasey made another trip in quest of the fern, this time going to Salisbury. He returned with some finely grown fronds which he brought to me for examination. These fronds had the same general characteristics as those he got at the "Pines," but all more intensified, so to speak.

We discussed the fern on several occasions and I remember particularly that I once asked Mr. Swasey whether he thought the fern most like *Thelypteris* or *Nove* (as we used to term it.) He answered that he thought it most like *Nove* despite the general outline of its fronds. He said that he considered it to be a variety of *Nove* and I at the time coincided with his opinion.

You will understand from Mr. Davenport's article in Garden and Forest Vol. IX, that terming this fern a variety of *Noveboracense* was a long step in advance. Mr. Davenport in the article referred to gives several instances where the fern had already been collected and referred to *A. Thelypteris*, once indeed by himself. Prof. Eaton also gave me the impression that he considered the fern to be a form of *Thelypteris*. . . .

I became much interested in the case, and began making excursions into the surrounding country in search of the fern. I found it in some cases growing by the acre, sometimes to the exclusion of any other species. I found too that when growing in localities where the trees had been cut away, thus exposing it to the direct rays of the sun, the fern took on the exact appearance of the narrow form of *Asplenium Filix-foemina* with condup-

licate pinnae, which *Thelypteris* and *Noveboracense* never do. I found also that small plants of this fern were almost identical in appearance with those of *A. Filix-foemina*. I communicated these facts to Mr. Davenport later on and it was the resemblance of the fern in certain stages to lady fern that caused him to name the plant *A. simulatum*.

I then remembered that I had seen what at the time I considered to be an immense amount of this narrow contracted form of lady fern growing years before at Folly Mill Woods in Seabrook, N. H., and had collected specimens. I made a trip to the place to look the matter up. I found that in my old locality for the supposed lady fern there was to be found an abundance of the new Aspidium and very little of the Asplenium, the ground having become shaded by a growth of young trees, but in the immediate neighborhood I found a place where the trees had been cut away recently and there the new fern with conduplicate pinnae was abundant.

I looked up my specimens and in doing so I also found that I had collected some fronds of the new fern which had grown under normal conditions as forms of *Aspidium Noveboracense*. These fronds were collected about 1880. My second visit to the locality about which I have been writing was made in August, 1892. . . .

When I sent the package of hybrid fronds and notes on the hybrid fern to Prof. Eaton in the autumn of 1892, I included in the bundle fronds of this fern which Mr. Davenport has termed *Aspidium simulatum* and also gave Prof. Eaton the results of my observations on it. Prof. Eaton requested me to send him plants of the fern for cultivating and I did so.

When I made the appointment to meet Mr. Davenport at Crooked Pond in Boxford, I placed some freshly gathered fronds of *simulatum* in my vasculum. After we had examined the hybrid plants at the foot of the

hills to the satisfaction of Mr. Davenport, and had taken a seat in the shade for awhile, I . . . . brought out my fronds of *simulatum* and asked him whether he considered they were fronds of *Thelypteris* or *Nove*. He replied that he considered they were fronds of neither. I then gave him a short account of my observations on the fern, telling him it was very abundant in some localities, remarking that the differences between the fern and *Thelypteris* and *Nove* were evidently not produced by environment, as without searching particularly I had noticed several places where a person without changing position could lay hands on a clump of each fern. Mr. Davenport became interested and we made arrangements for an excursion to the Small Pox woods in Salisbury a week from the following Sunday. Our trip to Crooked Pond was made on Saturday.

This is my story, or as much of it as has not appeared in the botanical journals. See . . . Fern Bulletin, Vol. IV, no. 3, for an article by myself. . . .

Anyone previously unfamiliar with this fern and who yet could easily distinguish between *Thelypteris* and *Nove* would, at the first sight of a growing clump, conclude that the fern was *Nove* with a peculiar habit of growth. Further examination, however, shows that the fronds at the base are more like those of *Thelypteris* but with inflexed pinnae of a differing shape. When pressed these fronds become still more like those of *Thelypteris* in appearance and so are very deceiving. To be sure, the venation is not that of *Thelypteris*, but as some fronds of *Thelypteris* have pinnae with quite simple veins, the experts let this difference pass by. Many little details of differences between the three ferns I communicated to Mr. Davenport and it was Mr. Davenport, be it remembered, that gave the final decision that the odd form was a new fern to be called *Aspidium simulatum*.

NEWBURYPORT, MASS., *May 27, 1907*.